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ABSTRACT: SPACECRAFT' MISSIONS 1'0 PLUTO AND CHARON

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Development of a planetary mission to complete the initial reconnaissance of the Solar System has begun at the Jet. Propulsion Laboratory. The Pluto Fast Flyby mission is to be the last of first missions to explore the planets of the Solar System. Two tiny spacecraft are to be launched in 1999 on direct trajectories to Pluto and its moon Charon, culminating in dual flybys in 2006.

The NASA-chartered Outer Planets Science Working Group (OPSWG) has designated basic scientific objectives for the Pluto Fast Flyby mission, including: 1) characterization of global geology and morphology, 2) surface composition mapping, and 3) characterization of the neutral atmosphere composition and structure. A "strawman" instrument payload consisting of a CCD imaging system, an IR spectrometer sharing the visual camera's foreoptics, a UV spectrometer and radio electronics has been proposed to achieve these minimum goals. In many areas, the proposed science capability exceeds that of *Voyager* at Triton, and indeed was derived partly based on Triton results.

Although this mission was born out of a discussion of a postage stamp in the Fall of 1991, it is not the first proposed mission to Pluto. Other mission concepts formulated as early as 1989 have been considered and dismissed, primarily due to high costs and/or long flight times. One of the earlier schemes envisaged a 350 kg spacecraft with a 45 kg science payload to get to Pluto by way of Earth and Jupiter gravity assists in a bit over 13 years. The authors detail other implementation options considered before arriving at the current plan.

The current baseline calls for a direct trajectory to Pluto of two 164 kg spacecraft to be launched on separate Titan

IV/Centaur or Proton (+ upper stages) vehicles. Advanced technology insertion work is in progress to reduce mass and flight time. A direct course was chosen to afford the earliest possible launch date, a short. cruise time (7-8 years) and data return within the spacecraft design and cost constraints. Each spacecraft encounter will be timed with Pluto and Charon's orbital period such that both hemispheres of both objects will be fully sunlit.

Cost is the primary design driver for this mission: total cost for both spacecraft, including mission operations through launch +30 days will be held to less than \$400M(FY92). This figure excludes the launch vehicle and radioisotope thermoelectric generator development. Science capacity, flight time and mass are the secondary design drivers.